PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 1677H/MG	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IT 03/00427	International filing date *(day/month/year)* 08.07.2003	Priority date *(day/month/year)* 10.07.2002
International Patent Classification (IPC) or both national classification and IPC G01F23/24		
Applicant OLIVETTI-JET S.P.A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
05.02.2004	11.05.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Roetsch, P Telephone No. +49 89 2399-2548

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IT 03/00427

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-13 as originally filed

Claims, Numbers

1-12 as originally filed

Drawings, Sheets

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

   see separate sheet

Reference is made to the following documents:

D1: US-A-5 613 398 (LAWSON JOHN C) 25 March 1997 (1997-03-25)
D2: EP-A-1 125 748 (HEWLETT PACKARD CO) 22 August 2001 (2001-08-22)
D3: US-A-4 853 718 (BUHLER STEVEN A ET AL) 1 August 1989 (1989-08-01)
D4: US-A-6 086 179 (KISHI MOTOSHI) 11 July 2000 (2000-07-11)

Ad Section V

1) The invention pertains to a system for detecting the level of a liquid in a tank.

2) **NOVELTY (independent claims 1 and 10)**

2.1) Document **D1** discloses (see figures 1-6 and related text passages) a system for detecting the level of a liquid in a tank (cf. col. 1, lines 4-6), comprising at least two electrodes extending into the inside of said tank, in contact with said liquid, said electrodes constituting a capacitor (22), the capacitance of which is variable in relation to the level of the liquid in said tank (cf. col. 1, lines 12-17), and influenced by environmental conditions and by physical properties of said liquid (cf. col. 1, lines 34-42), detecting means electrically connected to said electrodes (see figure 3), and a control unit (38) suitable for controlling said detecting means, said detecting means comprising a resistance (50) connected in *parallel* to said capacitor (see figure 3) and a current generator (62,64) connected in series with said resistance and said capacitor, said current generator being suitable for being activated by said control unit for powering said resistance and for charging said capacitance with said current until a predefined voltage is reached on the terminals of said resistance, during a corresponding charge time, representative of the current level of said liquid in said tank (cf. col. 6, lines 13-40), and in that said control unit is prearranged for storing said charge time in a memory (cf. col. 6, lines 36-40) and for activating at later times said generator for a duration, so that the capacitance is charged with a current such as to produce on said resistance a *predefined voltage drop*, the duration being proportional to the variation of said electrical characteristic caused by a corresponding variation of the level of said liquid, and independent of said environmental conditions and said physical properties (cf. col. 3, lines 7-16).

2.2) Document **D2** discloses (see figures 1-4 and 9) a system for detecting the

level of a liquid in a tank (cf. col. 1, lines 5-8), comprising: at least two electrodes (16,18) extending into the inside of said tank, in contact with said liquid (see figure 9 and col. 8, lines 27-28), said electrodes being separated by a volume of liquid presenting an own electrical resistance variable in relation to the level of the liquid in said tank, and influenced by environmental conditions and by physical properties of said liquid (cf. col. 3, lines 43-56 and col. 4, lines 27-35), detecting means (50) electrically connected to said electrodes, and powered by a voltage source (68), and a control unit suitable (56) for controlling said detecting means, said detecting means comprising a capacitance (46) connected to said resistance, and a diode (44) connected in series between said resistance and said capacitance, said diode being suitable for being activated by said control unit for powering said resistance and for charging said capacitance (cf. col. 5, line 44 to col. 6, line 3).

2.3) As far as claims 1 and 10 could be understood the following features from claims 1 and 10 are disclosed in none of the documents cited in the International Search Report:

- said detecting means comprise a current generator connected in series between the capacitor and the resistance and
- said control unit is prearranged for storing the charge time in a memory and for activating at later times said generator for a duration equal to said stored charge time, so that said capacitance is charged with a current such as to produce on said resistance a voltage drop proportional to the variation of said resistance caused by a corresponding variation of the level of said liquid.

2.4) Claims 1 and 10 thus meet the requirements of Article 33(2) PCT.

3) **INVENTIVE STEP (independent claims 1 and 10)**

3.1) When starting from **D1**, the objective problem can be seen as how to easily determine the level of a liquid in a tank in such a way that the indication of the level is independent of the environmental conditions and of the physical properties of said liquid.

3.2) The present invention solves the problem by using detecting means comprising a current generator powered with a constant current and connected in

series between the capacitor and the resistance. The current generator is suitable to deliver a constant current until a predetermined voltage is obtained and a control unit is prearranged to memorise the drive time of the current generator. At later times the control unit drives the circuit with a pulse of current of duration equal to the memorised time leading to the generation of a voltage drop representing the level of liquid no longer affected by the influences of the parasitic parameters.

3.3) Document **D1** is also concerned with the above-mentioned problem. Its solution is, however, different from that of the invention: the described system uses at least three different RC series combination, each responsible for one parameter (level, composition, temperature).

3.4) None of the cited document discloses similar detecting means

3.5) Claims 1 and 10 thus meet the requirements of Article 33(3) PCT.

4) **DEPENDENT CLAIMS**

The claims 2-9 and 11-12 are respectively dependent on claims 1 and 10 so that they also meet the requirements of Article 33(1) PCT.